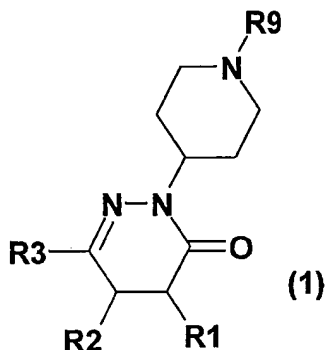


Patent claims

1. Compounds of formula 1

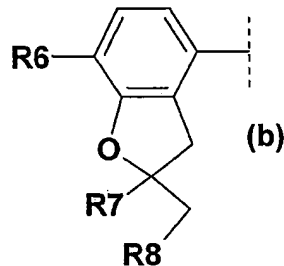
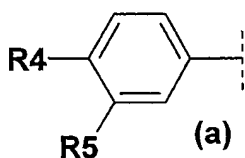


in which

R1 is hydrogen or 1-4C-alkyl,

R2 is hydrogen or 1-4C-alkyl,

R3 represents a phenyl derivative of formulae (a) or (b)



wherein

R4 is 1-4C-alkoxy or 1-4C-alkoxy which is completely or predominantly substituted by fluorine,

R5 is 1-8C-alkoxy, 3-7C-cycloalkoxy, 3-7C-cycloalkylmethoxy, or 1-4C-alkoxy which is completely or predominantly substituted by fluorine,

R6 is 1-4C-alkoxy, 3-5C-cycloalkoxy, 3-5C-cycloalkylmethoxy, or 1-4C-alkoxy which is completely or predominantly substituted by fluorine,

R7 is 1-4C-alkyl and

R8 is hydrogen or 1-4C-alkyl,

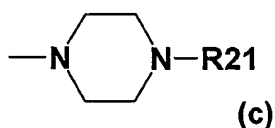
or wherein

R7 and R8 together and with inclusion of the two carbon atoms, to which they are bonded, form a spiro-linked 5-, 6- or 7-membered hydrocarbon ring, optionally interrupted by an oxygen or sulphur atom,

R9 is 1-4C-alkyl,  $-\text{S}(\text{O})_2\text{-R10}$ ,  $-\text{S}(\text{O})_2\text{-(CH}_2\text{)}_n\text{-R11}$ ,  $\text{-(CH}_2\text{)}_m\text{-S}(\text{O})_2\text{-R12}$ ,  $\text{-C}(\text{O})\text{R13}$ ,  $\text{-C}(\text{O})\text{-(CH}_2\text{)}_n\text{-R14}$ ,  $\text{-(CH}_2\text{)}_m\text{-C}(\text{O})\text{-R15}$ , Aryl1 or (Aryl2)-1-4C-alkyl,

R10 is 1-4C-alkyl, 5-dimethylaminonaphthalin-1-yl,  $\text{-N(R16)R17}$ , thiophenyl, phenyl or phenyl substituted by R18 and/or R19,

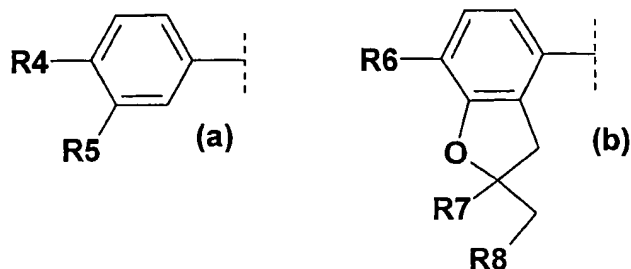
- R11 is phenyl or -N(R16)R17,  
 R12 is -N(R16)R17,  
 R13 is 1-4C-alkyl, hydroxycarbonyl-1-4C-alkyl, phenyl, 2,4,6-trichlorophenyl, pyridyl, 4-ethyl-piperazin-2,3-dion-1-yl or -N(R16)R17,  
 R14 is -N(R16)R17,  
 R15 is -N(R16)R17, phenyl or phenyl substituted by R18 and/or R19 and/or R20,  
 R16 is hydrogen, 1-7C-alkyl, 3-7C-cycloalkyl, 3-7C-cycloalkylmethyl, phenyl or phenyl substituted by R18 and/or R19 and/or R20,  
 R17 1-7C-alkyl, 3-7C-cycloalkyl, 3-7C-cycloalkylmethyl, phenyl or phenyl substituted by R18 and/or R19 and/or R20,  
 or  
 R16 and R17 together and with inclusion of the nitrogen atom to which they are bonded, form a 4-morpholinyl-, 1-pyrrolidinyl-, 1-piperidinyl-, 1-hexahydroazepino- or a 1-piperazinyl-ring of formula (c)



- wherein  
 R21 is 1-4C-alkyl, pyrid-4-yl, pyrid-4-ylmethyl, 2-methoxyphenyl, 1,1-diphenylmethyl, dimethyl-amino-1-4C-alkyl, dimethylaminocarbonylmethyl, N-methyl-piperidin-4-yl, 4-morpholino-ethyl or tetrahydrofuran-2-ylmethyl,  
 R18 is halogen, nitro, cyano, carboxyl, 1-4C-alkyl, trifluoromethyl, 1-4C-alkoxy, 1-4C-alkoxy which is completely or predominantly substituted by fluorine, 1-4C-alkoxycarbonyl, amino, mono-or di-1-4C-alkylamino, aminocarbonyl, 1-4C-alkylcarbonylamino or mono-or di-1-4C-alkylaminocarbonyl,  
 R19 is halogen, amino, nitro, 1-4C-alkyl or 1-4C-alkoxy,  
 R20 is halogen,  
 Aryl1 is pyrimidin-2-yl, thieno-[2,3-d]pyrimidin-4-yl, 1-methyl-1H-pyrazolo-[3,4-d]pyrimidin-4-yl, thiazolyl, imidazolyl, furanyl, pyridyl, phenyl or phenyl substituted by R18 and/or R19,  
 Aryl2 is pyridyl, phenyl, phenyl substituted by R18 and/or R19, 2-oxo-2H-chromen-7-yl or 4-(1,2,3-thiadiazol-4-yl)phenyl,  
 n is an integer from 1 to 4,  
 m is an integer from 1 to 4,  
 and the salts of these compounds.

2. Compounds of formula 1 according to claim 1 in which

- R1 is hydrogen,  
 R2 is hydrogen or 1-4C-alkyl,  
 R3 represents a phenyl derivative of formulae (a) or (b)



wherein

R4 is 1-2C-alkoxy or 1-2C-alkoxy which is completely or predominantly substituted by fluorine,

R5 is 1-4C-alkoxy,

R6 is 1-2C-alkoxy or 1-2C-alkoxy which is completely or predominantly substituted by fluorine,

R7 is methyl and

R8 is hydrogen,

or wherein

R7 and R8 together and with inclusion of the two carbon atoms, to which they are bonded, form a spiro-linked cyclopentane, cyclohexane, tetrahydrofuran or tetrahydropyran ring,

R9 is 1-4C-alkyl, -S(O)<sub>2</sub>-R10, -S(O)<sub>2</sub>-(CH<sub>2</sub>)<sub>n</sub>-R11, -C(O)R13, -C(O)-(CH<sub>2</sub>)<sub>n</sub>-R14, -(CH<sub>2</sub>)<sub>m</sub>-C(O)-R15 or (Aryl)<sub>2</sub>-1-4C-alkyl,

R10 is 1-4C-alkyl, 5-dimethylaminonaphthalin-1-yl, -N(R16)R17, thiophenyl, phenyl or phenyl substituted by R18 and/or R19,

R11 is phenyl,

R13 is 1-4C-alkyl, phenyl, pyridyl, 2,4,6-trichlorophenyl, 4-ethyl-piperazin-2,3-dion-1-yl or -N(R16)R17,

R14 is -N(R16)R17,

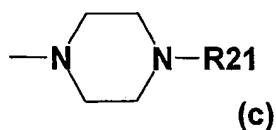
R15 is -N(R16)R17, phenyl or phenyl substituted by R18 and/or R19,

R16 is hydrogen, 1-7C-alkyl, 3-7C-cycloalkyl or 3-7C-cycloalkylmethyl,

R17 is 1-7C-alkyl, 3-7C-cycloalkyl or 3-7C-cycloalkylmethyl,

or

R16 and R17 together and with inclusion of the nitrogen atom to which they are bonded, form a 4-morpholinyl-, 1-pyrrolidinyl-, 1-piperidinyl-, 1-hexahydroazepino- or a 1-piperazinyl-ring of formula (c)



wherein

R21 is 1-4C-alkyl, pyrid-4-yl, 2-methoxyphenyl, 1,1-diphenylmethyl or N-methyl-piperidin-4-yl,

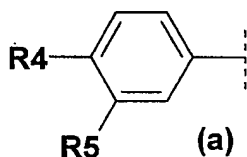
R18 is halogen, nitro, cyano, 1-4C-alkyl, trifluoromethyl, 1-4C-alkoxy, 1-4C-alkoxy which is completely or predominantly substituted by fluorine or 1-4C-alkoxycarbonyl,  
 R19 is halogen, amino, nitro, 1-4C-alkyl or 1-4C-alkoxy,  
 Aryl2 is pyridyl, phenyl or phenyl substituted by R18 and/or R19,  
 m is an integer from 1 to 2,  
 n is an integer from 1 to 2,  
 and the salts of these compounds.

3. Compounds of formula 1 according to claim 1 in which

R1 is hydrogen,

R2 is hydrogen or methyl,

R3 represents a phenyl derivative of formula (a)



wherein

R4 is 1-2C-alkoxy,

R5 is 1-2C-alkoxy,

R9 is  $-S(O)_2-R_{10}$ ,  $-S(O)_2-(CH_2)_n-R_{11}$ ,  $-C(O)R_{13}$ ,  $-C(O)-(CH_2)_n-R_{14}$ ,  $-(CH_2)_m-C(O)-R_{15}$  or (Aryl2)-1-2C-alkyl,

R10 is 1-4C-alkyl, 5-dimethylaminonaphthalin-1-yl,  $-N(R_{16})R_{17}$ , thiophenyl, phenyl or phenyl substituted by R18 and/or R19,

R11 is phenyl,

R13 is 1-4C-alkyl, phenyl, 2,4,6-trichlorophenyl, pyridyl, 4-ethyl-piperazin-2,3-dion-1-yl or  $-N(R_{16})R_{17}$ ,

R14 is  $-N(R_{16})R_{17}$ ,

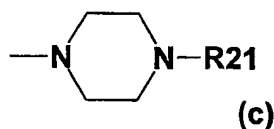
R15 is  $-N(R_{16})R_{17}$ ,

R16 is hydrogen or 1-4C-alkyl,

R17 is 1-4C-alkyl,

or

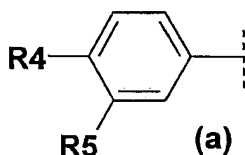
R16 and R17 together and with inclusion of the nitrogen atom to which they are bonded, form a 4-morpholinyl-, 1-pyrrolidinyl-, 1-piperidinyl- or a 1-piperazinyl-ring of formula (c)



wherein

R21 is 1-4C-alkyl, pyrid-4-yl, 2-methoxyphenyl or 1,1-diphenylmethyl,  
 R18 is halogen, cyano, 1-4C-alkyl, trifluoromethyl, 1-4C-alkoxy or 1-4C-alkoxy which is completely or predominantly substituted by fluorine,  
 R19 is 1-4C-alkyl or 1-4C-alkoxy,  
 Aryl2 is pyridyl or phenyl,  
 m is 1,  
 n is 1,  
 and the salts of these compounds.

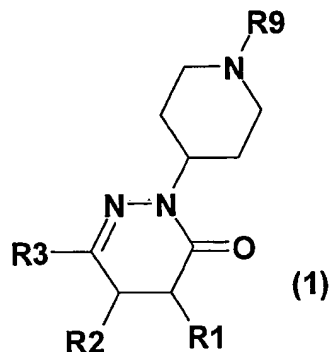
4. Compounds of formula 1 according to claim 1 in which  
 R1 is hydrogen,  
 R2 is hydrogen or methyl,  
 R3 represents a phenyl derivative of formula (a)



wherein

R4 is methoxy,  
 R5 is methoxy and  
 R9 is acetyl, morpholin-4-ylcarbonyl, pyridin-3-ylmethyl, 4-ethyl-piperazin-2,3-dion-1-ylcarbonyl, 4-methylpiperazin-1-ylcarbonyl, 5-dimethylamino-naphthalene-1-sulfonyl, 2-(morpholin-4-yl)-2-oxo-ethyl, 4-methylbenzenesulfonyl, methylsulfonyl, 4-chlorobenzenesulfonyl, benzylsulfonyl, 4-methoxybenzenesulfonyl, benzenesulfonyl, 2,5-dimethoxybenzenesulfonyl, 2-cyanobenzenesulfonyl, thiophen-2-ylsulfonyl, 2-fluorobenzenesulfonyl, 2-trifluoromethoxybenzenesulfonyl, dimethylaminosulfonyl, benzoyl, pyridin-3-ylcarbonyl, 2,4,6-trichlorobenzenecarbonyl, tert-butylaminocarbonyl, dimethylaminocarbonylmethyl, 2-(4-methyl-piperazin-1-yl)-2-oxo-ethyl, 2-(4-pyridin-4-ylpiperazin-1-yl)ethanoyl, 2-[4-(2-methoxyphenyl)piperazin-1-yl]ethanoyl or 2-[4-(1,1-diphenylmethyl)piperazin-1-yl]ethanoyl,  
 and the salts of these compounds.

## 5. Compounds of formula 1

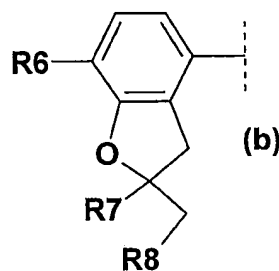
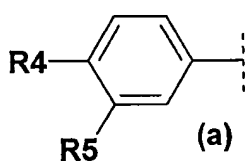


in which

R1 is hydrogen or 1-4C-alkyl,

R2 is hydrogen or 1-4C-alkyl,

R3 represents a phenyl derivative of formulae (a) or (b)



wherein

R4 is 1-4C-alkoxy or 1-4C-alkoxy which is completely or predominantly substituted by fluorine,

R5 is 1-8C-alkoxy, 3-7C-cycloalkoxy, 3-7C-cycloalkylmethoxy, or 1-4C-alkoxy which is completely or predominantly substituted by fluorine,

R6 is 1-4C-alkoxy, 3-5C-cycloalkoxy, 3-5C-cycloalkylmethoxy, or 1-4C-alkoxy which is completely or predominantly substituted by fluorine,

R7 is 1-4C-alkyl and

R8 is hydrogen or 1-4C-alkyl,

or wherein

R7 and R8 together and with inclusion of the two carbon atoms, to which they are bonded, form a spiro-linked 5-, 6- or 7-membered hydrocarbon ring, optionally interrupted by an oxygen or sulphur atom,

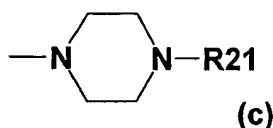
R9 is hydrogen, 1-4C-alkyl,  $-S(O)_2-R_{10}$ ,  $-S(O)_2-(CH_2)_n-R_{11}$ ,  $-(CH_2)_m-S(O)_2-R_{12}$ ,  $-C(O)R_{13}$ ,  $-C(O)-(CH_2)_n-R_{14}$ ,  $-(CH_2)_m-C(O)-R_{15}$ , Aryl1 or (Aryl2)-1-4C-alkyl,

R10 is 1-4C-alkyl, 5-dimethylaminonaphthalin-1-yl,  $-N(R_{16})R_{17}$ , phenyl or phenyl substituted by R18 and/or R19,

R11 is  $-N(R_{16})R_{17}$ ,

R12 is  $-N(R_{16})R_{17}$ ,

- R13 is 1-4C-alkyl, hydroxycarbonyl-1-4C-alkyl, phenyl, pyridyl, 4-ethyl-piperazin-2,3-dion-1-yl or -N(R16)R17,  
 R14 is -N(R16)R17,  
 R15 is -N(R16)R17, phenyl or phenyl substituted by R18 and/or R19 and/or R20,  
 R16 and R17 are independent from each other hydrogen, 1-7C-alkyl, 3-7C-cycloalkyl, 3-7C-cycloalkyl-methyl, phenyl or phenyl substituted by R18 and/or R19 and/or R20, or R16 and R17 together and with inclusion of the nitrogen atom to which they are bonded, form a 4-morpholinyl-, 1-pyrrolidinyl-, 1-piperidinyl-, 1-hexahydroazepino- or a 1-piperazinyl-ring of formula (c)

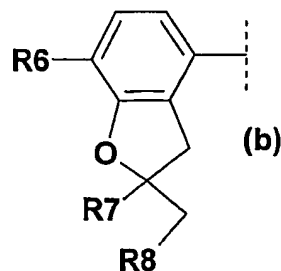
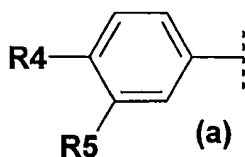


wherein

- R21 is 1-4C-alkyl, pyrid-4-yl, pyrid-4-ylmethyl, dimethylamino-1-4C-alkyl, dimethylaminocarbonylmethyl, N-methyl-piperidin-4-yl, 4-morpholino-ethyl or tetrahydrofuran-2-ylmethyl,  
 R18 is halogen, nitro, cyano, carboxyl, 1-4C-alkyl, trifluoromethyl, 1-4C-alkoxy, 1-4C-alkoxycarbonyl, amino, mono- or di-1-4C-alkylamino, aminocarbonyl, 1-4C-alkylcarbonylamino or mono- or di-1-4C-alkylaminocarbonyl,  
 R19 is halogen, amino, nitro, 1-4C-alkyl or 1-4C-alkoxy,  
 R20 is halogen,  
 Aryl1 is pyrimidin-2-yl, thieno-[2,3-d]pyrimidin-4-yl, 1-methyl-1H-pyrazolo-[3,4-d]pyrimidin-4-yl, thiazolyl, imidazolyl, furanyl, pyridyl, phenyl or phenyl substituted by R18 and/or R19,  
 Aryl2 is pyridyl, phenyl, phenyl substituted by R18 and/or R19, 2-oxo-2H-chromen-7-yl or 4-(1,2,3-thiadiazol-4-yl)phenyl,  
 n is an integer from 1 to 4,  
 m is an integer from 1 to 4,  
 and the salts of these compounds.

6. Compounds of formula 1 according to claim 5, in which

- R1 is hydrogen,  
 R2 is hydrogen or 1-4C-alkyl,  
 R3 represents a phenyl derivative of formulae (a) or (b)



wherein

R4 is 1-2C-alkoxy or 1-2C-alkoxy which is completely or predominantly substituted by fluorine,

R5 is 1-4C-alkoxy,

R6 is 1-2C-alkoxy or 1-2C-alkoxy which is completely or predominantly substituted by fluorine,

R7 is methyl and

R8 is hydrogen,

or wherein

R7 and R8 together and with inclusion of the two carbon atoms, to which they are bonded, form a spiro-linked cyclopentane, cyclohexane, tetrahydrofurane or tetrahydropyran ring,

R9 is hydrogen, 1-4C-alkyl,  $-S(O)_2-R_{10}$ ,  $-C(O)R_{13}$ ,  $-(CH_2)_m-C(O)-R_{15}$ , Aryl1 or (Aryl2)-1-4C-alkyl,

R10 is 1-4C-alkyl, 5-dimethylaminonaphthalin-1-yl or  $-N(R_{16})R_{17}$ ,

R13 is 1-4C-alkyl, phenyl, 4-ethyl-piperazin-2,3-dion-1-yl or  $-N(R_{16})R_{17}$ ,

R15 is  $-N(R_{16})R_{17}$ , phenyl or phenyl substituted by R18 and/or R19 and/or R20,

R16 and R17 are independent from each other hydrogen, 1-7C-alkyl, 3-7C-cycloalkyl, 3-7C-cycloalkyl-methyl, phenyl or phenyl substituted by R18 and/or R19 and/or R20, or R16 and R17 together and with inclusion of the nitrogen atom to which they are bonded, form a 4-morpholinyl-, 1-pyrrolidinyl-, 1-piperidinyl-, 1-hexahydroazepino- or a 4-methyl-piperazin-1-yl-ring,

R18 is halogen, nitro, cyano, 1-4C-alkyl, trifluoromethyl, 1-4C-alkoxy or 1-4C-alkoxycarbonyl,

R19 is halogen, amino, nitro, 1-4C-alkyl or 1-4C-alkoxy,

R20 is halogen,

Aryl1 is pyrimidin-2-yl, thieno-[2,3-d]pyrimidin-4-yl, 1-methyl-1H-pyrazolo-[3,4-d]pyrimidin-4-yl, pyridyl, phenyl or phenyl substituted by R18 and/or R19,

Aryl2 is pyridyl, phenyl, phenyl substituted by R18 and/or R19, 2-oxo-2H-chromen-7-yl or 4-(1,2,3-thiadiazol-4-yl)phenyl,

m is an integer from 1 to 2,

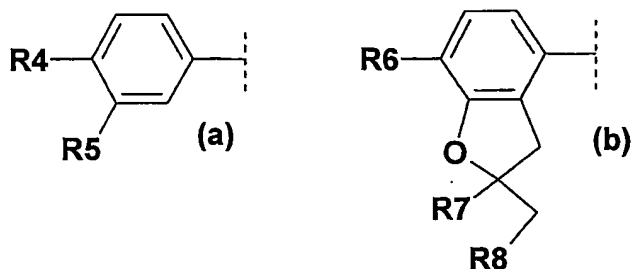
and the salts of these compounds.

7. Compounds of formula 1 according to claim 5, in which

R1 is hydrogen,

R2 is hydrogen or methyl,

R3 represents a phenyl derivative of formulae (a) or (b)





wherein

R4 is 1-2C-alkoxy,

R5 is 1-4C-alkoxy,

R6 is 1-2C-alkoxy,

R7 is methyl and

R8 is hydrogen,

R9 is hydrogen,  $-S(O)_2-R_{10}$ ,  $-C(O)R_{13}$ ,  $-(CH_2)_m-C(O)-R_{15}$  or (Aryl2)-1-2C-alkyl,

R10 is 1-4C-alkyl, 5-dimethylaminonaphthalin-1-yl or  $-N(R_{16})R_{17}$ ,

R13 is 1-4C-alkyl, 4-ethyl-piperazin-2,3-dion-1-yl or  $-N(R_{16})R_{17}$ ,

R15 is  $-N(R_{16})R_{17}$ ,

R16 and R17 are independent from each other hydrogen or 1-4C-alkyl, or R16 and R17 together and with inclusion of the nitrogen atom to which they are bonded, form a 4-morpholinyl ring, a 1-piperidinyl ring or a 4-methyl-piperazin-1-yl ring,

Aryl2 is pyridyl or phenyl,

m is 1,

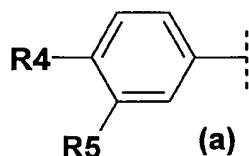
and the salts of these compounds.

8. Compounds of formula 1 according to claim 5, in which

R1 is hydrogen,

R2 is methyl,

R3 represents a phenyl derivative of formula (a)



wherein

R4 is methoxy,

R5 is methoxy and

R9 is acetyl, morpholin-4-ylcarbonyl, pyridin-3-ylmethyl, 4-ethyl-piperazin-2,3-dion-1-yl, 4-methylpiperazin-1-yl, 5-dimethylamino-naphthalene-1-sulfonyl or morpholin-4-yl-2-oxo-ethyl,

and the salts of these compounds.

9. Compounds of formula 1 according to claim 1 or 5 for the treatment of diseases.

10. Pharmaceutical compositions containing one or more compounds of formula 1 according to claim 1 or 5 together with the usual pharmaceutical auxiliaries and/or carrier materials.

11. Use of compounds of formula 1 according to claim 1 or 5 for the preparation of pharmaceutical compositions for the treatment of airway disorders.
12. A method for treating an illness treatable by the administration of a PDE4 inhibitor in a patient comprising administering to said patient in need thereof a therapeutically effective amount of a compound of formula 1 as claimed in claim 1 or 5.
13. A method for treating airway disorders in a patient comprising administering to said patient a therapeutically effective amount of a compound of formula 1 as claimed in claim 1 or 5.